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ABSTRACT

This paper discusses the relationship between the elementary science curriculum and curriculum development, and the actual elementary science program that is taught in the school. The roles of curriculum theory, instruction, curriculum statements, goals, and science program objectives are all reviewed. (SI)

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CURRICULUM THEORY:

APPLICATIONS FOR DEVELOPING ELEMENTARY SCIENCE PROGRAMS

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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by

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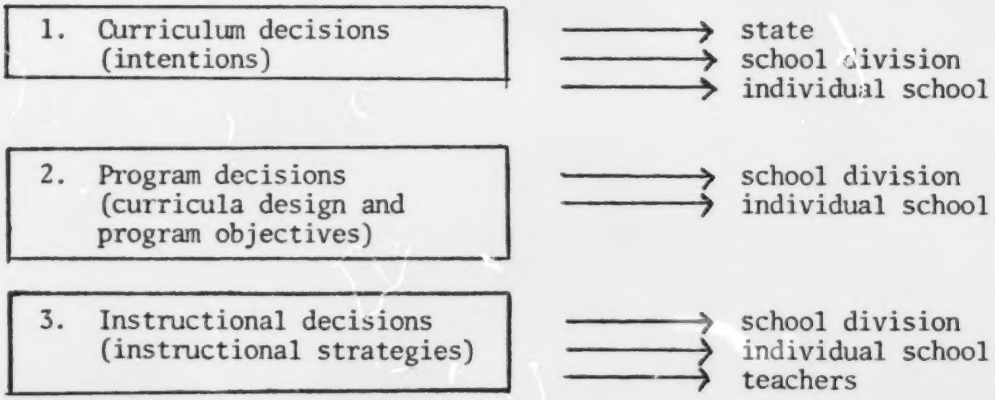
THE CURRICULUM PERSPECTIVE

In spite of the common use of the term, curriculum development is not a major activity of our schools. In most cases such activity refers to development of specific programs such as, (i.e., mathematics, science, reading, or instructional planning.) Curriculum development refers to the establishment of the overall educational plan of what the purpose is and the objectives are for students of a group or individual school. There cannot be an elementary science curriculum, there can only be an elementary science program. Emphasis on curriculum development in this manner is complex, time-consuming, and frustrating, but absolutely necessary. Construction of an elementary science program cannot logically and systematically proceed until a functional curriculum statement has been prepared.

Decisions about a program area should not be made without reference to a curriculum statement to guide program and instructional planning. Thus, before the principal and staff of an elementary school can proceed with planning at the program or instructional level, they must review prior curricular decisions as a frame of reference, both at the school division and state level. The process outlined above appears to require the following sequence of decisions:



(Myers, Goodlad)

Need for Curriculum Theory in Educational Decision Making

The value of a working curriculum theory has been given a minor position in the educational hierarchy and, as a result, increasing criticism has been leveled at the inconsistency of curricula and instructional decisions in our educational system. Theory provides the base for deciding practice. Curriculum theory defines what constitutes a curriculum and the criteria for decision making. Such a theory would also clarify the role of other components in the educational system, such as; instruction, administration, evaluation, and supervision.

A functional curriculum theory serves the purposes of identifying and defining those elements that constitute the formation of an adequate educational program. A curriculum theory also determines which concepts and processes are essential and avoids, by planned emission, concern for those areas not directly related, such as instructional theories, questions of scope and sequence, and student evaluation. (White, pp. 8-9) A curriculum theory is a set of assumptions and propositions which, when adhered to, will produce an acceptable curriculum statement consistent with all definitions and assumptions. (Beauchamp, pp. 57-61)

Assumption # 1

The major purpose of the curriculum is to establish parameters for teaching and learning.

In accordance with this assumption, the curriculum should:

1. provide statements defining what students will do (learn).
2. provide guidance for selecting the appropriate curriculum design.
3. establish the range of acceptable instructional strategies to be used by teachers.

Assumption # 2

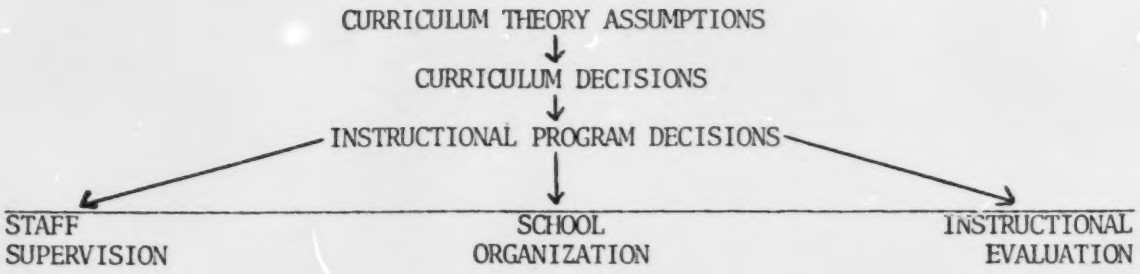
A philosophical position by the local policy-making body (school board) indicating purposes and aims of the school system is essential.

It is the responsibility of the local school board to identify the values, purposes, and procedures to be followed in the development of a curriculum. A statement, setting forth values and purposes of education, is vital to the curriculum development system, so as to avoid actions by the professional staff outside the parameters of acceptability to the community who they serve.

Assumption # 3

All other educational components (e.g., administration, staff organization, instruction, personnel selection) are dependent on curriculum decisions.

If a properly developed curriculum identifies the purpose of an organization, it follows that any activity or procedure within that organization, designed to aid in the attainment of those purposes, should be consistent with the curriculum. As an example, instructional theory is secondary to curriculum, since without a curriculum there could not be any criteria for the establishment and selection of instructional strategies. Diagrammatically this would follow as:



Assumption # 4

The curriculum should be a written document.

Historically the curriculum has been defined by oral tradition providing limited opportunity for critical analysis, implementation, or evaluation. A written document provides opportunities for detailed and in-depth analysis of these concerns.

Assumption # 5

The goals and objectives of a curriculum are political decisions, as well as educational. Therefore, they must be verified through political channels.

In some cases where the policy-making body has provided the guidelines for curricular decisions/workers there has been an inadequate translation resulting in a curriculum not in keeping with the communities' desires. This possibility requires that the curriculum document be subject to community review and discussion similar to the manner of approving such documents as zoning ordinances in local governments. (Saylor, Krist, Beauchamp)

Assumption # 6

A curriculum should be developed which encompasses the entire population for which it was designed with subsequent modifications for specific population samples within the community.

A curriculum statement representing the total population of the educational system for which it was designed is of primary importance. Conceivably this document could be prepared at the national, state, school division, or individual school level. Variations among samples of the population to be served will require modification of curricular objectives. For example, some objectives will not need to be emphasized for certain groups because that intention is already being handled by some other organization or institution. Additionally, emphasis on other objectives may be inappropriate for certain groups of students based on age, sex, maturity, or other criteria established within the framework of the curriculum statement.

Assumption # 7

The design (organization) of the curriculum should be consistent with the attainment of the intended learnings and philosophical statement.

Traditionally, schools have accepted by default, a subject-matter, discipline-centered, or series of courses curricular design, without establishing the need for this particular format of relationships among the various elements of a curriculum. Alternative designs, such as: fused, correlated, structured or unstructured problems, and social functions should be explored to determine consistency with the stated curricular intentions.

Assumption # 8

The selection of cultural content may be drawn from the disciplines or conventional wisdom areas of knowledge.

The curriculum statement should provide sufficient information to establish criteria for selecting appropriate culture content. Such content should not be restricted to conventional subject matter content unless so stipulated within the curriculum statement.

Assumption # 9

Curriculum evaluation is accomplished through the consistent and logical use of statements previously noted in curricular decision making.

Most educators and lay citizens believe that assessment of student learnings should the criteria for evaluating a curriculum. This simply is not so. Such a procedure is a form of assessing instruction. Curriculum evaluation can only be accomplished by utilizing the assumptions of curriculum theory and subsequently developed criteria, as a check on the use of logic in curriculum decision making.

LEVELS OF DECISION MAKING IN CURRICULUM AND INSTRUCTION

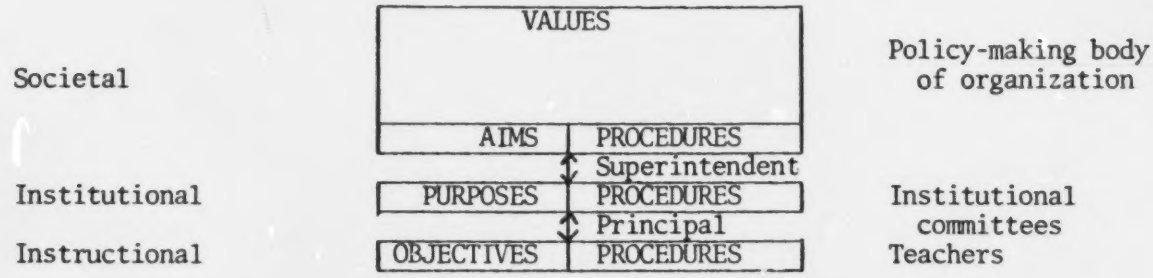
Once the curriculum theory assumptions have been stated, it becomes possible to begin the process of curriculum development which requires that the developers attend to the following areas:

1. levels of decision making.
2. the curriculum development system.
3. the instructional system.
4. the relationship between the output of the curriculum development system to the instructional system.

The first area of concern, levels of curriculum decision making, was clarified by the work of Goodlad and Richter in The Development of a Conceptual System for Dealing With Problems of Curriculum and Instruction (1966). Myers in Decision Making in Curriculum and Instruction (1970) further refined the Goodlad-Richter conceptual model to the point of useability by school division personnel. (Figure 1)

Myers proposes that there are three levels of curriculum/instructional decision making; societal, institutional, and instructional. In general, it can be said that the Societal Level involves policy level decisions of "aims of education" and subsequent "procedures" for implementing those aims. The Institutional Level translates policy decisions (aims) into the actual curriculum statement that the institution (school division) has identified as being most important for the children of its community to learn. The Instructional Level involves the selection and organization of objectives, student activities, and instructional strategies designed to accomplish the intended outcomes of the curriculum.

Figure 1



(Myers, p. 11)

The Societal Level: The framework of decision making, proposed by Myers, suggests that the policy-making body of an organization has three major tasks to perform:

1. specify the values that should guide the organization's educational program.
2. establish the global aims of the organization.
3. establish procedures for decision making.

(Myers, p. 14; Goodlad, pp. 34-39)

Inherent in the clarification of an organization's values and aims is the influence of both state and federal educational policies, regulations, statistics, and standards. These influences on curriculum decision making include: state law; Board of Education policies; guidelines from federal programs; regional state accreditation agencies; and professional associations. See Saylor and Alexander, Planning Curriculum for Schools, or Krist and Walker, "An Analysis of Curriculum Policy-Making" for a detailed discussion of these influences.

The decisions made at the societal level provide the basis for eventually coping with assumptions number 1, 2, 3, 4, 5, 7, and 8. Without a statement of acceptable values, global aims, and approved procedures of decision-making curricula by the policy-making body of an educational organization, there can be no consistent reference point

from which decisions at the instructional and institutional levels can be made. The lack of such guidance can only continue to operationally define curriculum as; "what a teacher does, after the door is closed."

The Institutional Level: The decisions made at this level are done in an effort to effectively state the curriculum as defined by assumptions No. 1-9. Myers defines this level as, "The institutional level exists as an instrument of vehicle for carrying out the will of the societal level." (Myers, p. 20) Members of the institutional level have the responsibility of translating the values and global aims into "intended student outcomes," establishing the acceptable curricula design, setting parameters for teaching practices and the selection of instructional strategies, school organization, instructional supervision, and evaluation, as examples.

This level of decision making is generally staffed by division-wide administrators and supervisors; while principals, parents, teachers, and students may function temporarily as members of this level by serving on committees or task forces. Increased specificity is the end product of the institutional level in the form of a written curriculum which then becomes the basis for the third level of decision making, the instructional level.

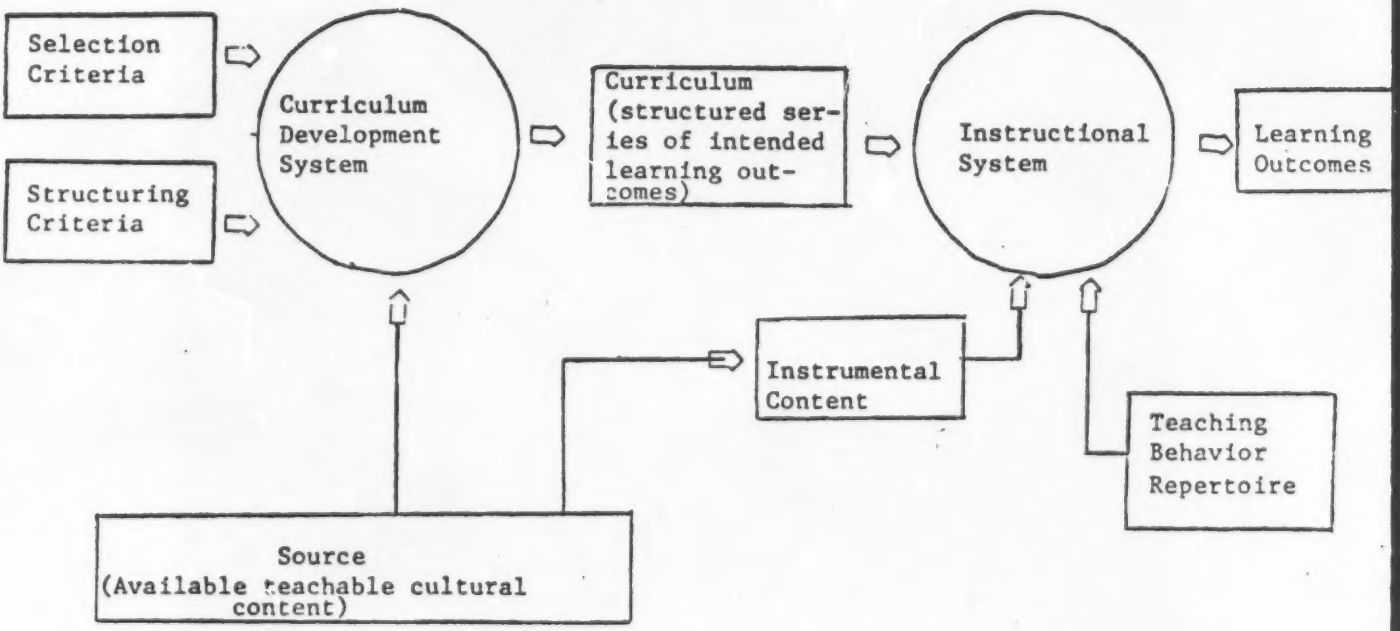
The Instructional Level: The role of teachers is paramount to this level of decision making. Teachers are trained to function as instructional specialists, in that once the curriculum has been established, it is their responsibility to select from among the range of acceptable means, how the "intended outcomes" are to be learned. Included in this level are the development of instructional objectives, procedures, and criteria which are then utilized on a day by day basis for instructional decision making.

Assumptions 1, 2, and 5 are best dealt with by examining the following curriculum-instructional model (Figure 2) by Johnson (1967). As input into the curriculum development system the policy-making unit(s) of an educational institution must provide sufficient information to identify selection and structuring criteria. Such criteria would be an interpretation of the decisions made at the societal level. In addition, the procedures followed by members of the institutional level in the development of a curriculum should have been established prior to entering the curriculum development process. The output of Johnson's curriculum development system is the curriculum document, a set of intended outcomes, and should comply with previously stated curriculum theory assumptions. The curriculum document is the basis for selection of program content and instructional strategies.

The actual curriculum product is the result of the actions of the members of the institutional level utilizing the stated selection and structuring criteria to identify appropriate curriculum content in the manner prescribed by the procedures element agreed to by the policy-making body of the organization.

The curriculum then becomes the primary reference point for decisions at the instructional level. Instructional personnel select appropriate content to facilitate the "intended outcomes" and identify the instructional strategy(ies) consistent with what is to be learned. Figure 3 provides a graphic display of how the Myers' decision-making levels and Johnson's curriculum instructional model overlap.

FIGURE 2



A model showing curriculum as an output of one system and an input of another. (Johnson, p. 46)

STRUCTURING THE CURRICULUM

Section of curriculum items: There have been numerous attempts to develop selection criteria, but almost with exception such criteria have been applicable only to the instructional level of planning (e.g., psychological stage development, reading level.) The value of criteria for selection of curricula items resides in the reduction of areas to be concerned with in developing the curriculum. Examples of such criteria are:

-Curriculum content is of two types, disciplinary and non-disciplinary. Goodlad refers to them as "funded knowledge and conventional wisdom," respectively;

-Curriculum content must be teachable;

-Curriculum content should be selected on the basis of consistency with ideology;

-Curriculum content for a training program may differ from an educational program (see prior definitions);

-The selection of some curriculum items preconcludes the inclusion or exclusion of other items; (Johnson, pp. 48-49)

-Needs and interests of students;

-Economy of learning.

Structure of curriculum items: The initial definition of curriculum-a structured series of intended outcomes-implies a relationship among the items included in it. The curriculum reform efforts of the 1960's emphasized as an organizing factor, "the inherent structure of the disciplines" developed and elaborated by Bruner, Phenix, and Schwarb. More recent reform efforts appear to be relying more on psychological rather than logical order (Bode, Ost, Eckenrod). Additional examples of the criteria for structuring curricular items include:

-Taxonomies in the areas of cognitive, psychomotor, or affective domains;

-The achievement of a specific outcome may require certain prerequiste learnings;

-The articulation of a developing curriculum with a curriculum from a preceeding unit (school) of the organization;

-The ideology or values identified in the societal level.

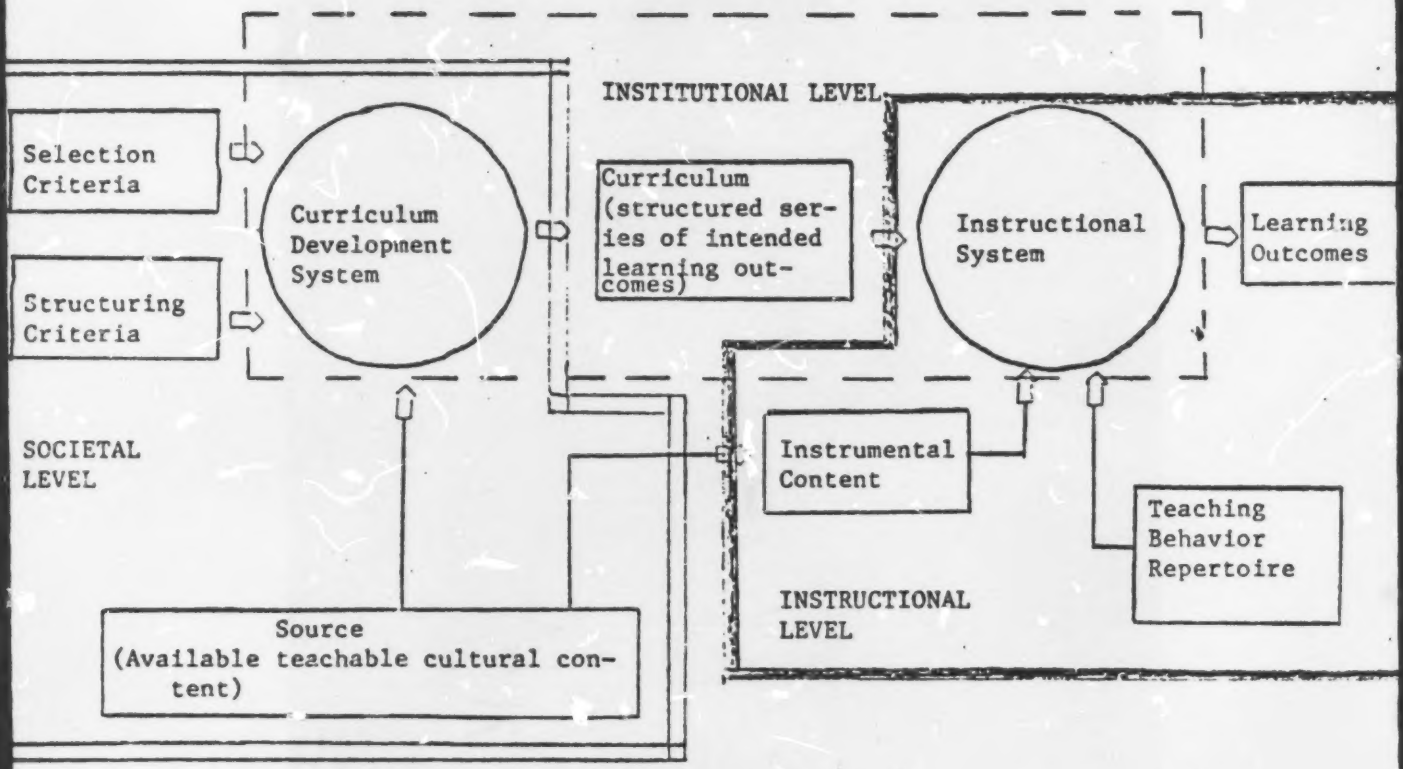
Source of Curriculum Content (available, teachable, cultural content): This area consists of two types of content:

1. organized knowledge and processes within disciplines (funded knowledge; i.e. atomic structure).

2. unorganized knowledge and skills (conventional wisdom, i.e. intutitive acts).

FIGURE 3

Combination of Myers' and Johnson's Models



Customarily, schools have shown concern only for "organized knowledge" by curriculum default, when in fact, it should be a planned systematic decision based on statements from the societal level of decision making.

DEVELOPING A LOCAL CURRICULUM STATEMENT

The first part of this publication has identified and described the following:

1. assumptions of a curriculum theory;
2. definition of terms;
3. influences on the curriculum;
4. levels of decision making in curriculum and instruction; and
5. the relationship of curriculum to instruction.

These provide the framework for the development of an elementary science program. The remainder of this publication will be devoted to presenting an example of the expected outcome of applying the propositions outlined to a fictitious school division in the Commonwealth of Virginia.

The definition of basic aims and the purpose of public education in a state initially reside in the actions of the legislative body and the Board of Education. The Virginia General Assembly, with the Board of Education concurring, approved the following six (6) goals for the public schools in Virginia (for example purposes only).

> "Whereas, Section II of Article VIII of the State Constitution of Virginia provides that standards of quality for the several school divisions shall be determined and prescribed from time to time by the Board of Education, subject to revision only by the General Assembly; and
>
> Whereas, the goals of public education in Virginia are to aid each pupil, consistent with his or her abilities and educational needs, to:
>
> 1. Become competent in the fundamental academic skills;
> 2. Be qualified for further education and/or employment;
> 3. Participate in society as a responsible citizen;
> 4. Develop ethical standards of behavior and a positive and realistic self-image;
> 5. Exhibit a responsibility for the enhancement of beauty in daily life;
> 6. Practice sound habits of personal health..."
>
> (Appendix B)

These goals correspond to Myers' definition of "aims" at the societal level in his decision making framework. Although not explictly stated in the Standards of Quality 1976-78, certain value positions are inherent in the statement of aims and the subsequent standards that were prescribed by the Board of Education. Specifically, standard 9 has implications for curriculum development. Additionally, Virginia School Laws and Board of Education policies establish procedures for school division personnel to adhere to in the decision making process.

Standard 9, Planning and Public Involvement, requires that each school division biennially prepare a six-year school improvement plan that

shall be reviewed and approved by the local school board. Three of the four components of these standards are directly related to the "procedures" aspect of the societal level of Myers' model. They are:

1. development of a clearly defined curricula statement.
2. identification of strategies for achieving curricula intentions.
3. community participation in planning the aims and procedures of a school division's curriculum.

A second example of "procedures" at the societal level is the selection of textbooks by the Virginia Board of Education. Procedures have been identified for school division personnel in accordance with Article 3, Section 22-318.1 of the Virginia Constitution. The policies and regulations adopted by the Board of Education provide the parameters for selecting instructional materials at the school division level within the framework of these statutes. This is clearly in compliance with Myers' conception of the type of activities at the societal level.

Since the development of Standards of Quality there has been a trend to cluster more of the activities at the societal level as a reciprocal relationship between the Board of Education and local school board division's Boards of Education. Local school boards are increasingly expected to be responsible for interpreting and carrying out the actions of the Board of Education. The goals of education, set forth in Standards of Quality and Objectives for Public Schools in Virginia, may serve as an example. It is the responsibility of the school division to establish a curriculum statement. The statement should apply to all sub-components of the system (individual schools) and all sub-sequent decisions must conform to these criteria. An example of such a statement might be:

The mission of the _____ public schools is to share in the community's responsibility for the development of each student into a citizen who can stand confidently, participate fully, learn continually, and contribute positively in his/her world.

The _____ School Division is committed to providing a range of opportunities so that the following GOALS may be attained:

A. To ensure that each student develops proficiency in basic learning and process skills.

B. To ensure that each student develops the capacity to recognize, confront, and cope with the social, economic, and political problems of an unknown future.

C. To ensure development of each student's individuality within the context of social responsibility.

D. To ensure for each student access to participation in cultural arts and physical activity experiences.

E. To ensure that each student develops personal knowledge and habits that contribute to physical and mental health.

F. To ensure the development of positive interpersonal relationships among students, staff, and community.

These six goals refine and extend the goals of public education in Virginia as stated in Standards of Quality. Such goals as these provide general direction to the purpose of education in a specific school division. Additional clarity needs to be provided before effective programs can be developed on the basis.

Refinement of each of the goals of the school division will provide an opportunity for selection and structuring of all curricular items. After the process of delineating objectives under each of the goals, the question of curricular design must be attended to be the members of the institutional level. For example, as institutional committee could take each of the six goals and define what is to be learned,

e. g. Goal A. To ensure that each student develops proficiency in basic learning and process skills.

1.0 All students will be able to add, subtract, multiply, and divide.

1.1 Using whole numbers.

1.2 Including decimals.

2.0 All students will be able to classify a set of objects.

2.1 Using a three-stage system.

2.2 Reclassify a set of objects using different criteria.

Traditionally, most American and British schools have followed a subject-matter design. The selection, however, has occurred more by default, than by decision making. Other possible designs include: correlated, fused, pre-planned problems, and unplanned problems. If a school division has a well-defined curricular statement, it would be possible to logically decide on the most appropriate curricular design. For example purposes ONLY; and NOT because of any superior value, the subject-matter design will be used in the remainder of this publication. Following are the aims, goals, and program objectives for a typical Elementary Science Program. Again this is only an example.

PURPOSES OF THE SCIENCE PROGRAM (K-12)

A primary objective of science education is to develop student skills that will result in productive and efficient thought processes. Science education seeks to encourage exploration and discovery, to identify relationships through experimentation, to describe and measure with precision, to stimulate purposeful imagination and inference, and to become acquainted with the conceptual schemes that undergird the world of science.

The K-12 science program of the _____ schools is sequential to the extent that elementary science units develop basic observational and critical thinking skills, vocabulary, and attitudes toward inquiry while secondary science places greater emphasis on factual and concept development.

The major goals of science education are:

1. To enable future citizens to analyze, evaluate, appreciate the effects of the sciences on society;

2. To help students understand scientific methods of coping with problems, sufficient for problems which students will face in their individual and social life;

3. To help students have a better understanding of the world, and especially the world as it affects them concretely, and not be spectators of the "mysterious" doings of scientists or of their products;

4. To kindle enthusiasm for the intrinsic delights of scientific knowledge, because it will make life more enjoyable, and because society needs scientists in every field of human endeavor;

5. To understand the place of science among the other intellectual and esthetic pursuits; to see the sciences as being themselves a humanistic enterprise, as much as literature, the arts, history, and religion, connected closely with them even while differing;

6. To promote a deeper understanding of the natural processes of science and to relate the problem of exploiting science to possible deleterious consequences for society;

7. To provide students with rich and varied experiences that foster critical thinking and develop capabilities for cooperative enterprise and mutual aid;

8. To help students understand the position of their future job or activity in society as a whole, so as to establish a realistic and productive self-knowledge.

9. To educate students so that they may distinguish ends from means, probabilities from certainties, evidence from propaganda, rational belief from superstition and science from quackery.

The statement of goals for a K-12 science program provide the basis for; development of elementary science objectives, selection of instructional materials, establishing criteria for teacher evaluation, allocation of human and material resources, development of instructional objectives, and identification of learning activities. The objectives of an elementary science program consistent with the goals of the school division and the K-12 objectives must take into consideration certain state, regional, and national guidelines. One example of such criteria is the Standards of Accrediting Elementary Science in Virginia effective July 1, 1976, which states that:

1. Clearly defined objectives shall be established for the science program.

2. The program shall be planned to include the acquisition of factual knowledge and the sequential development of concepts, skills, and values.

3. The program shall include the social, physical, and biological aspects of science.

4. The program shall be designed to develop process skills of observing, defining, classifying, communicating, measuring, inferring, predicting, experimenting, questioning, hypothesizing, interpreting, and generalizing.

The following elementary science developmental goals and program objectives for elementary science are one of the end products of the "institutional level" of decision making. These goals and objectives should be accepted as a division-wide statement to establish the parameters for instruction in the elementary schools of the school division.

ELEMENTARY SCIENCE DEVELOPMENTAL PROGRAM GOALS (K-7)

The elementary science program is designed to develop critical thinking skills and to foster positive attitudes such as curiosity, initiative, self-reliance, and persistence--traits that are essential if children are to learn how to learn. In developing the elementary program a great deal of attention has been placed on blending the cognitive, affective, and psychomotor skills.

Developmental Goals

Curiosity and Interest - Science education provides the child with an opportunity to explore the real world, the world of technology, and the world of nature. The child should be encouraged constantly to explore the nature and significance of changes in living and non living things.

Initiative and Inventiveness - Throughout their years in the elementary schools, children should have opportunities to practice the methods of science and to use tools and apparatus needed to investigate a variety of scientific problems. Children, like scientists, must be allowed to inquire and make discoveries in their own way. The teacher should encourage such inquiry as far as time, resources, and interest allow.

Observation and Record Keeping - When children discover something of interest, they usually want to communicate their findings to the teacher and their classmates. Sometimes children prefer to use the written word and sometimes the spoken word. Some paint pictures; others build models. With assistance they can make graphs and express their findings with numbers. Such creative activities are the tangible products of direct inquiry and independent study.

Independent Critical Thinking - Through scientific inquiry, children may discover that there are several ways to test an idea or make an observation. They should be encouraged to develop methods to test their ideas before accepting or rejecting them. As their intellectual development increases, children will be willing to accept factual evidence even if it contradicts preconceived ideas. During the course of a unit, facts are gathered and integrated into patterns. Year by year these patterns are generalized as concepts and, as such, resemble to some degree the conceptual scheme of a scientist.

Persistence - Children must be encouraged to continue to investigate the materials provided in each science unit even after the novelty of the materials has worn off or after their classmates have finished their investigations. Teachers should respond positively to children's requests for permission to work at home on activities begun in school, for extra time to complete experiments, or for permission to seek independently information about the subject the class is investigating. By observing changes over a period of time, they begin to understand the necessity for waiting and keeping records of these changes and learn to suspend judgment until sufficient observations have been made. The allows them to risk making mistakes without feeling unsuccessful.

These broad developmental goals define the intent of the elementary science program. The following program level objectives are more specific and provide criteria for the development of instructional objectives and selection of learning activities.

ELEMENTARY SCIENCE PROGRAM OBJECTIVES, K-7

I. Rational Thinking Processes

1.1 OBSERVING
The student will use all senses in the identification of objects and their properties, changes in properties, controlled observations, and ordering of a series of observations.

1.2 CLASSIFYING
The student will classify objects, actions, and phenomena.

1.3 MEASURING
The student will demonstrate the ability to use standard units of measurement in determining length, area, volume, weight, and temperature.

1.4 COLLECTING AND ORGANIZING DATA
The student will collect and organize information pertaining to a problem, communicate it verbally or graphically, and present these data in such a way that trends can be analyzed.

1.5 INFERRING
The student will make inferences, suggesting explanations, reasons, or causes for events which have occurred.

1.6 PREDICTING
The student will predict an outcome from a trend in data using inference, extrapolation, or interpolation.

1.7 IDENTIFYING AND CONTROLLING VARIABLES
The student will identify the independent and dependent variables in experiments and describe how variables are controlled and interrelated.

1.8 HYPOTHESIZING
The student will identify a question or problem that can be tested.

1.9 EXPERIMENTING
The student will make use of all rational thinking processes cited above by designing and carrying out a scientific investigation and reporting its results.

II. Manipulating Equipment

2.1 UTILIZATION
The student will assemble and use the appropriate tools and apparatus needed to investigate a problem.

2.2 CONSTRUCTION
The student will construct testing devices when commercially prepared instruments are not available or practical.

III. Communication Skills

3.1 SUMMARIZING
The student will describe orally, in writing, or non-verbally conclusions about the processes and products of scientific inquiry.

3.2 REPORTING
The student will communicate scientific information by organizing and presenting data in graphic or mathematical symbols.

IV. Concepts

4.1 FACTS AND CONCEPTS
The student will know and apply facts and simple scientific concepts.

4.2 CONCEPT TRANSFER
The student will apply scientific concepts to other areas of the curriculum, and vice-versa.

V. Attitudes and Values

5.1 CURIOSITY/PERSISTENCE
The student will demonstrate curiosity and persistence in the study of science.

5.2 VALUING SCIENTIFIC INQUIRY
The student will participate willingly in science activities, accept evidence gathered through scientific methods, and value critical thinking.

5.3 SELF-CONFIDENCE
The student will develop self-confidence in the study of science by becoming involved in a variety of activities. Through participation in activities, the student will develop a positive self-image and an "I can do it" attitude toward the study of science and its application to everyday problems.

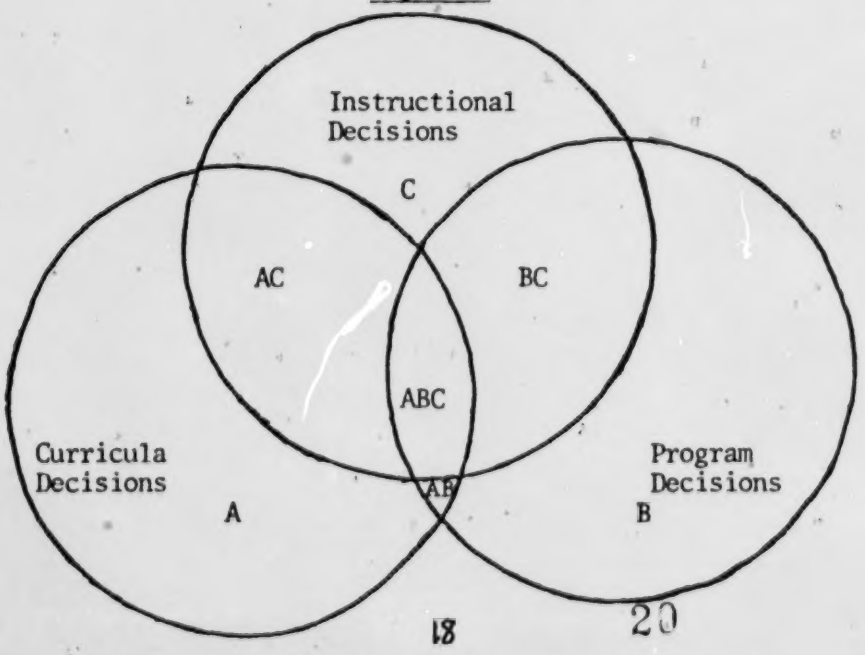
NOTE: These objectives were adapted from the Elementary Science Study Evaluation Program (McGraw Hill, 1973).

SELECTION OF INSTRUCTIONAL STRATEGIES

Another product of decision making should be the delineation of acceptable instructional strategies form which teachers may select the appropriate strategy, depending on student abilities, program objectives, type of instructional materials available, or teacher competencies. Instructional decisions should always be consistent with prior curriculum and program decisions made at the societal and institutional levels. Figure 4 illustrates the relationship of curricula/program/instructional decisions.

INSTRUCTIONAL PARAMETERS

Figure 4



As can be seen from Figure 4, set C encompasses all possible instructional strategies, but only those strategies within the intersection (ABC), meet the criteria set forth in prior decisions. Thus, the institutional level is responsible for setting the parameters of instructional methods.

At the instructional level, as illustrated in Figure 1, decision making centers on the activities of teachers in an individual school, as supported by the actions of the principal and central office staff. Decisions at this level are extremely complex, specific, and practical. Teachers are expected to use prior decisions, societal and institutional, and established procedures as criteria for classroom instruction. If the prior decisions are clearly established, the question of whether "the purpose of the elementary science is primarily to transmit factual information" should be readily answered. A set of instructional strategies should have been adequately defined at the institutional level. The teacher, however, still has the responsibility to select the appropriate strategy or strategies to meet specific objectives or to serve particular students, as well as to develop and select instructional materials.

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